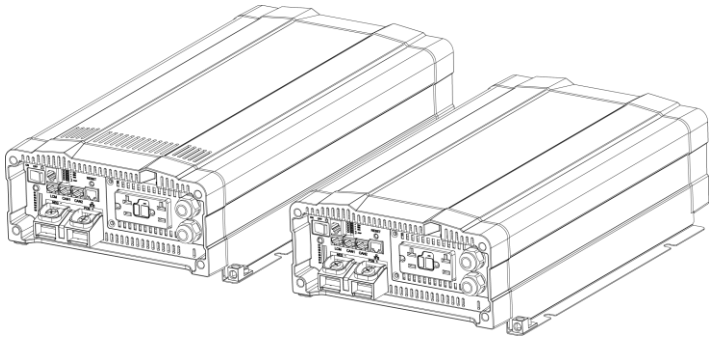
COTEK

SD Series

Pure Sine Wave

Power Inverter

User's Manual



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1. Important Safety Information

WARNING!

Before using the Inverter, read and save the safety instructions.

1-1. General Safety Precautions

1-1-1 Do not expose the Inverter to rain, snow, spray, bilge or dust. To reduce risk of hazard, do not cover or obstruct the ventilation openings. Do not install the Inverter in a zero-clearance compartment. Overheating may take place.

1-1-2 To avoid a risk of fire and electric shock, please make sure that existing wiring is in good electrical condition; and that wire size is not undersized. Do not operate the Inverter with damaged or substandard wiring.

1-1-3 This equipment contains components which can produce arcs or sparks.
To prevent fire or explosion do not install in compartments containing batteries or flammable materials or in locations which require ignition protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, joints, fittings, or other connection between components of the fuel system.

1-2. Precautions When Working with Batteries

1-2-1 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately wash eyes with running cold water for at least 20 minutes and get medical attention immediately.

1-2-2 Never smoke or allow a spark or flame in vicinity of battery or engine.

1-2-3 Do not drop a metal tool on the battery. The resulting spark or short-circuit on the battery or other electrical part may cause an explosion.

1-2-4 Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery.
A lead-acid battery produces a short-circuit current high enough to weld a ring or similar item to metal causing a severe burn.

1-3. Installation

The power inverter should be installed in a location that meets the following requirements:

1-3-1 Dry – Do not allow water to drip or splash on the inverter.

1-3-2 Cool – Ambient air temperature should be between -20℃ and 50℃, but he cooler the better.

1-3-3 Safety – Do not install batteries in the compartment or other areas here flammable fumes existence such as fuel storage areas or engine compartments.

1-3-4 Ventilated – Allow at least one inch of clearance around the Inverter for air flow. Ensure the ventilation shafts on the rear and bottom of the unit are not obstructed.

1-3-5 Dust-free – Do not install the Inverter in dusty environments here dust, wood particles or other filings/shavings are present. The dust can be pulled into the unit when the cooling fan is in operation.

1-3-6 Close to batteries – Avoid excessive cable lengths but do not install the inverter in the same compartment as batteries.
Use the recommended wire lengths and sizes (see section 4-3).
Do not mount the inverter where it is exposed to the gases produced by the battery. These gases are very corrosive and prolonged exposure will damage the inverter.

WARNING !
Shock Hazard. Before proceeding further, carefully check that the inverter is NOT connected to any batteries, and that all wiring is disconnected from any electrical sources . Do not connect the output terminals of the inverter to an incoming AC source.

2. Functional Characteristics

2-1. General Information

SD-series is new generation power inverter equipped with N+1 parallel power function , 3-phase capability, and AC transfer switch. SD series is suitable for RV, Marine and Emergency appliances.

Features

- Parallel redundancy design for power expansion
- Multiple industrial applications that create 1Φ3ω / 3Φ4ω power systems
- User-friendly remote control
- Automatic master mechanism to eliminate single point failure and optimize reliability
- Built-in ATS and AC circuit breaker
- Optional STS module, transfer time is less than 4ms.
- RS-232 communication
- Input & output fully isolation
- Output voltage / power saving mode is selectable by DIP switch and remote control (CR-10)
- Input Protection: Reverse Polarity (Fuse) / Under Voltage / Over Voltage Protection
- Output Protection: Short Circuit / Overload / Over Temperature / Over Voltage Protection

To get the most out of the power inverter, it must be installed and used properly. Please read the instructions in this manual before installation and operation of this model.

2-2. Application

2-2-1 Power tools–circular saws, drills, grinders, sanders, buffers, weed and hedge trimmers, air compressors.

2-2-2 Office equipment – computers, printers, monitors, facsimile machines, scanners.

2-2-3 Household items – vacuum cleaners, fans, fluorescent and incandescent lights, shavers, sewing machines.

2-2-4 Kitchen appliances – coffee makers, blenders, ice markers, toasters.

2-2-5 Industrial equipment – metal halide lamp, high pressure sodium lamp.

2-2-6 Home entertainment electronics – television, VCRs, video games, stereos, musical instruments, satellite equipment.

2-2-7 Vehicle, yacht and off-grid solar power systems.

2-3. Electrical Performance

MODEL	SD2500-112	SD2500-124	SD2500-148	SD2500-212	SD2500-224	SD2500-248
Output						
Rating Power	2500W (de-rating after 40°C, refer to de-rating curve)					
Peak Power (3Sec.)	3000W					
Surge Power (<0.2Sec.)	4000W					
Waveform	Pure Sine Wave					
Efficiency (Max.)	88%	89%	90%	88%	88%	90%
Output Voltage (@rated VDC)	100 / 110 / 115 / 120VAC ±3%			200 / 220 / 230 / 240VAC ±3%		
Output Frequency	50 / 60Hz ±0.1%					
Total Harmonic Distortion (THD)	< 3% (@rated / VDC, linear load)					
DC Input						
DC Voltage	12VDC	24VDC	48VDC	12VDC	24VDC	48VDC
Voltage Range	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC
No load Power Consumption	@12VDC	@24VDC	@48VDC	@12VDC	@24VDC	@48VDC
On Mode @ Save Mode	0.9A	0.35A	0.3A	1.1A	0.7A	0.4A
On Mode @ No Load Mode	< 2.9A	< 1.4A	< 0.8A	< 3.6A	< 1.8A	< 1A
Fuse	40Ax9	20Ax9	10Ax9	40Ax9	20Ax9	10Ax9
AC Input						
AC Range	100 / 110 / 115 / 120VAC ±12.5%			200/220/230 /240VAC ±12.5%		
Frequency Selectable	50/60 Hz					
Synchronous Frequency	47 – 57 / 53 – 63 Hz					
Circuit Breaker	30A			16A		
Transfer Switch	Standard ATS : Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~50ms.					
	Optional STS mode : <4 ms					

MODEL	SD2500-112	SD2500-124	SD2500-148	SD2500-212	SD2500-224	SD2500-248
Protection						
BAT.Low Alarm	10.5VDC	21.0VDC	42.0VDC	10.5VDC	21.0VDC	42.0VDC
BAT.Low Shut-down	10.0VDC	20.0VDC	40.0VDC	10.0VDC	20.0VDC	40.0VDC
BAT.Low Restart	12.5VDC	25.0VDC	50.0VDC	12.5VDC	25.0VDC	50.0VDC
BAT.High Alarm	15.5VDC	31.0VDC	62.0VDC	15.5VDC	31.0VDC	62.0VDC
BAT.High Shut-down	16.0VDC	32.0VDC	64.0VDC	16.0VDC	32.0VDC	64.0VDC
BAT.High Restart	15.0VDC	30.0VDC	60.0VDC	15.0VDC	30.0VDC	60.0VDC
Input Protection	Reverse Polarity (Fuse) / Under Voltage / Over Voltage Protection / AC over current (Breaker)					
Output Protection	Short Circuit / Overload / Over Temperature / Over Voltage Protection					
Environment						
Working Temp.	-20 ~ +60°C; refer SD2500 power de-rating curve					
Storage Temp.	-40 ~ +70°C					
Relative Humidity	Max. 90%, non-condensing					
Safety & EMC						
Safety Standards	Meet UL 458			Certified EN60950-1		
EMC Standards	Certified FCC Class B			Certified EN 55014, EN 61000-3-2, EN 61000-3-3; EN 61000-4-2, 3, 4, 5, 6, 11		
Control & Signal						
LED Indicator	Input voltage level, output load level and faulty status					
Remote Control	CR-6, CR-8 and CR-10					
Others						
Dimension (W x H x D)	283x128.4x436 mm / 11.146x5.056x17.156 Inch					
Weight	8 kg					
Cooling	Load & Thermal control fan					
Communication Port	RS-232 (RJ-11 type connector), Ethernet (Optional)					

*Note: The specifications are subject to change without prior notice.

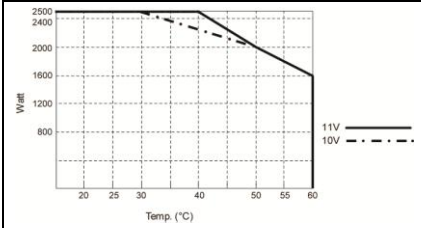
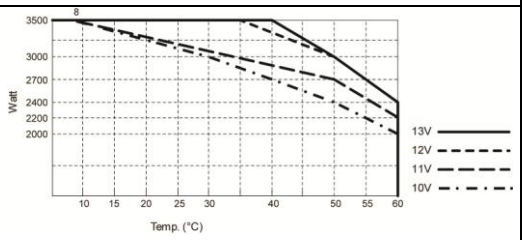
All the test environments are conducted under the rated power operation conditions.

MODEL	SD3500-112	SD3500-124	SD3500-148	SD3500-212	SD3500-224	SD3500-248
Output						
Rating Power	3500W (de-rating after 35°C, refer to de-rating curve for 12V) (de-rating after 40°C, refer to de-rating curve for 24V and 48V)					
Peak Power (3Sec.)	4500W					
Surge Power (<0.2Sec.)	6000W					
Waveform	Pure Sine Wave					
Efficiency (Max.)	90%	90%	91%	90%	91%	91%
Output Voltage (@rated VDC)	100 / 110 / 115 / 120VAC ±3%			200 / 220 / 230 / 240VAC ±3%		
Output Frequency	50 / 60Hz ±0.1%					
Total Harmonic Distortion (THD)	< 3% (@rated / VDC, linear load)					
DC Input						
DC Voltage	12VDC	24VDC	48VDC	12VDC	24VDC	48VDC
Voltage Range	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC	10.0~16.0 VDC	20.0~32.0 VDC	40.0~64.0 VDC
No load Power Consumption	@12VDC	@24VDC	@48VDC	@12VDC	@24VDC	@48VDC
On Mode @ Save Mode	1.4A	0.5A	0.5A	1.4A	0.5A	0.5A
On Mode @ No Load Mode	< 2.9A	< 1.4A	< 0.8A	< 3.6A	< 1.8A	< 1A
Fuse	40Ax12	40Ax12	10Ax12	40Ax12	40Ax12	10Ax12
AC Input						
AC Range	100/110/115 /120VAC ±12.5%			200/220/230/240VAC ±12.5%		
Frequency Selectable	50/60 Hz					
Synchronous Frequency	47 – 57 / 53 – 63 Hz					
Circuit Breaker	30A			16A		
Transfer Switch	Standard ATS : Inverter to utility AC: 8~10ms.; Utility AC to inverter: 16~50ms.					
	Optional STS mode : <4 ms					

MODEL	SD3500-112	SD3500-124	SD3500-148	SD3500-212	SD3500-224	SD3500-248
Protection						
BAT.Low Alarm	10.5VDC	21.0VDC	42.0VDC	10.5VDC	21.0VDC	42.0VDC
BAT.Low Shut-down	10.0VDC	20.0VDC	40.0VDC	10.0VDC	20.0VDC	40.0VDC
BAT.Low Restart	12.5VDC	25.0VDC	50.0VDC	12.5VDC	25.0VDC	50.0VDC
BAT.High Alarm	15.5VDC	31.0VDC	62.0VDC	15.5VDC	31.0VDC	62.0VDC
BAT.High Shut-down	16.0VDC	32.0VDC	64.0VDC	16.0VDC	32.0VDC	64.0VDC
BAT.High Restart	15.0VDC	30.0VDC	60.0VDC	15.0VDC	30.0VDC	60.0VDC
Input Protection	Reverse Polarity (Fuse) / Under Voltage / Over Voltage Protection / AC over current (Breaker)					
Output Protection	Short Circuit / Overload / Over Temperature / Over Voltage Protection					
Environment						
Working Temp.	-20 ~ +60°C; refer SD3500 power de-rating curve					
Storage Temp.	-40 ~ +70°C					
Relative Humidity	Max. 90%, non-condensing					
Safety & EMC						
Safety Standards	Meet UL 458			Certified EN60950-1		
EMC Standards	Certified FCC Class B			Certified EN 55014, EN 61000-3-2, EN 61000-3-3; EN 61000-4-2, 3, 4, 5, 6, 11		
Control & Signal						
LED Indicator	Input voltage level, output load level and faulty status					
Remote Control	CR-6, CR-8 and CR-10					
Others						
Dimension (WxHxD)	283x128.4x496 mm / 11.146x5.056x19.527 inch					
Weight	10 kg					
Cooling	Load & Thermal control fan					
Communication Port	RS-232 (RJ-11 type connector), Ethernet (Optional)					

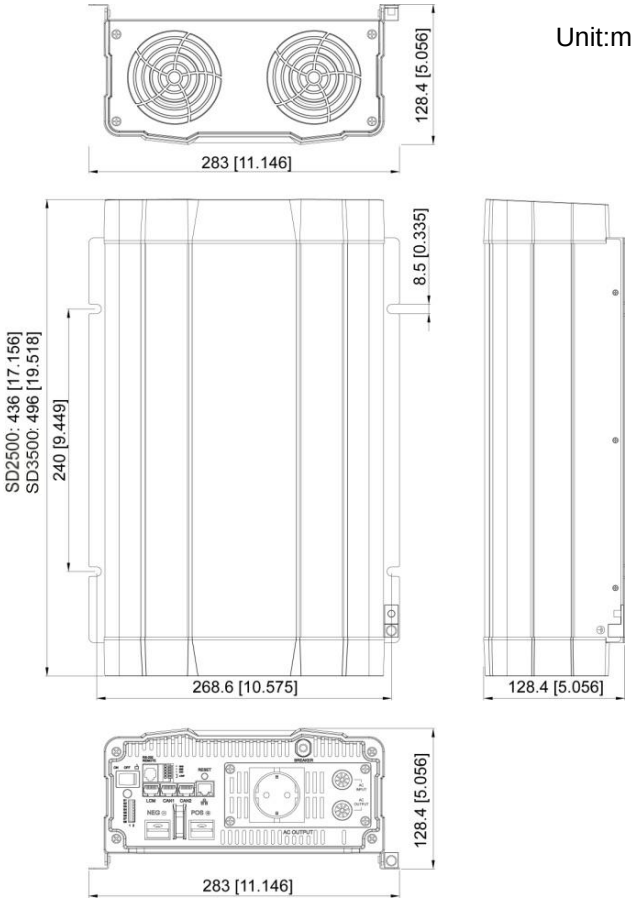
*Note: The specifications are subject to change without prior notice.

All the test environments are conducted under the rated power operation conditions.

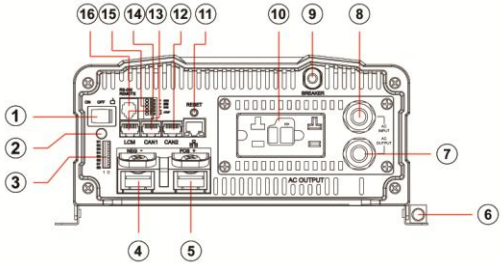
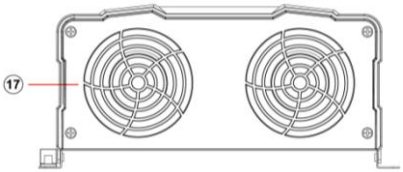
De-rating Curve	
SD 2500	SD 3500
	

2-4. Mechanical Drawings

Unit:mm [inch]



3. Introduction

Front Panel	
Rear Panel	

Front Panel/Rear Panel			
1	Power ON/OFF/REMOTE (Main) switch	10	AC output socket
2	Status LED	11	Reset Button
3	Dip Switch (S1~S8)	12	CAN2 Port (only to be used in parallel mode)
4	DC Input -	13	CAN1 Port (only to be used in parallel mode)
5	DC Input +	14	LCM Port (Connection for LCD remote control panel)
6	Chassis Ground	15	Green terminal (Remote and Parallel select)
7	AC Output	16	Remote / RS-232 port
8	By-pass AC Input	17	FAN
9	AC input circuit breaker		

3-1. Power ON / OFF / REMOTE (Main) switch:

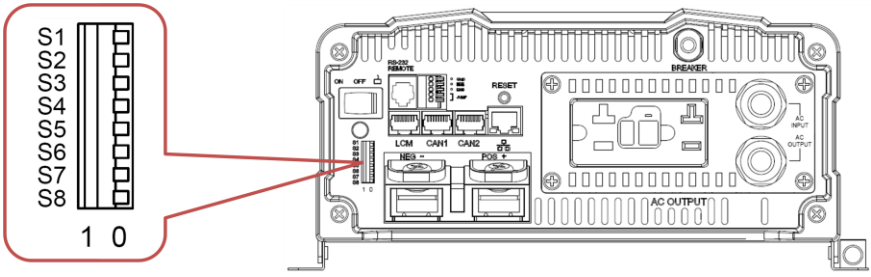
A. Before installing the inverter, please ensure the main switch is in the OFF position.

B. Before using the remote unit, please ensure the main switch is in the REMOTE position.

3-2. LED Indicator

Green LED	LED Signal	Status
Solid	———	Power OK
Slow Blink	— — — —	Power Saving
Orange LED	**LED Signal**	**Status**
Fast Blink	— — — — — — — — —	OVP
Slow Blink	— — — —	UVP
Red LED	**LED Signal**	**Status**
Intermittent Blink	- - - - - -	OTP
Fast Blink	— — — — — — — — —	OVP- Shut-down
Slow Blink	— — — —	UVP- Shut-down
Slow Blink	———	OLP
Intermittent Blink	— - - — - -	Fan Failure

3-3. DIP Switch (S1~S8) Assignment



PIN#	PIN Assignment
1	AC output voltage setting
2	AC output voltage setting
3	AC output frequency setting
4	To set-up 3 Phase output or Energy-saving level
5	To set-up 3 Phase output or Energy-saving level
6	To set-up 3 Phase output or Energy-saving level
7	To set-up DIP Switch S4~S6 for power saving or 3 Phase output
8	To set-up function parameters adjustment via LCM or DIP switch

3-3-1 DIP switch Set-up

S1	S2	S3	S4	S5	S6	S7	S8	Scenario
0	0	X	X	X	X	X	X	AC output voltage : 100VAC/200VAC
0	1	X	X	X	X	X	X	AC output voltage : 110VAC/220VAC
1	0	X	X	X	X	X	X	AC output voltage : 115VAC/230VAC
1	1	X	X	X	X	X	X	AC output voltage : 120VAC/240VAC
X	X	0	X	X	X	X	X	AC output frequency : 50Hz
X	X	1	X	X	X	X	X	AC output frequency : 60Hz
X	X	X	X	X	X	0	X	Power saving mode setting (S4~S6); No master-slave in parallel
X	X	X	X	X	X	1	X	3 Phase output setting (S4~S6)
X	X	X	X	X	X	X	0	Adjust function parameters via LCM
X	X	X	X	X	X	X	1	Adjust function parameters via DIP switch

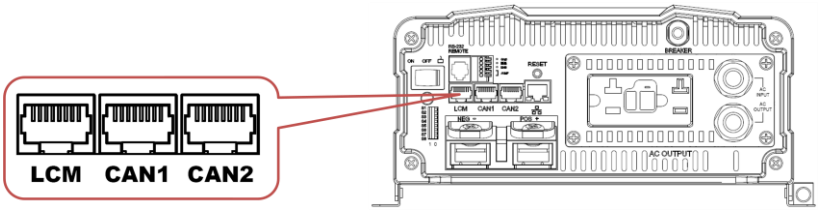
3-3-2 Power Saving Mode

Power Saving Mode is adjustable and set by the Dip Switches,S4, S5 and S6 on the front panel. Example SD2500: Saving set 2%, the load is below 40W 10 sec. will into saving mode, more than 80W or more leave saving mode.

S1	S2	S3	S4	S5	S6	S7	S8	Scenario
X	X	X	0	0	0	0	X	Power saving DISABLE
X	X	X	0	0	1	0	X	Go in power saving mode when output load is under 2% of rating power
X	X	X	0	1	0	0	X	Go in power saving mode when output load is under 3% of rating power
X	X	X	0	1	1	0	X	Go in power saving mode when output load is under 4% of rating power
X	X	X	1	0	0	0	X	Go in power saving mode when output load is under 5% of rating power
X	X	X	1	0	1	0	X	Go in power saving mode when output load is under 6% of rating power
X	X	X	1	1	0	0	X	Go in power saving mode when output load is under 7% of rating power
X	X	X	1	1	1	0	X	Go in power saving mode when output load is under 8% of rating power

3-3-3 S4~S6 Set-up for 3 Phase output

S1	S2	S3	S4	S5	S6	S7	S8	Scenario
X	X	X	0	0	0	1	X	Master (0°); "R" Phase to be used for 1Ø3W output in series connection(Master) or 3Ø4W output connection("R" Phase)
X	X	X	0	0	1	1	X	Slave (0°) with current sharing to be used in parallel connection only
X	X	X	0	1	0	1	X	Slave (0°), to be used for 1Ø3W output in series connection(L-NL-N)
X	X	X	0	1	1	1	X	Slave (180°), to be used for 1Ø3W output in series connection(L-NN-L)
X	X	X	1	0	0	1	X	Slave (-120°), "S" Phase to support "S" Phasebe(-120°) in 3Ø4W output connection
X	X	X	1	0	1	1	X	Slave (120°), "T" Phase to support "T" Phasebe(120°) in 3Ø4W output connection
X	X	X	1	1	0	1	X	Reserved
X	X	X	1	1	1	1	X	Reserved



3-3-4 Parameter select: “S8” select SD’s parameter setting by dip switch or LCM

Set Value	S8
LCM	0
DIP SWITCH	1

3-4. DC Input - : (please refer to DC wiring connections on p.16)

3-5. DC Input + : (please refer to DC wiring connections on p. 16)

3-6. Chassis Ground: Connect the wire # 8 AWG to vehicle chassis.

WARNING!

Operating the inverter without a proper ground connection may cause electrical safety hazard.

3-7. AC Output : (Please refer to Hard wiring connections on p. 19)

3-8. By-pass AC input: (please refer to Hard wiring connections on p. 19)

3-9. AC input circuit breaker :

The AC input circuit breaker protects the model from overload. When an overload condition exists, the circuit breaker stops supplying output AC grid power. To reset it, push the circuit breaker switch then the model will be back in normal operation. The source fault should be corrected before you reset it.

3-10. AC output socket : (please refer to Hard wiring connections on p. 19)

3-11. Reset Button (only to be used for Ethernet interface)

The Reset Button is to be used to resume the IP address to factory default value:

Default Setting	
IP	192.168.100.181
Subnet Mask	255.255.255.0

3-12, 3-13. CAN1 and CAN2 Port: (only to be used in parallel mode)

1. Before using parallel mode, you need to ensure the green terminal's parallel jump status is set to ON.
2. Use the RJ-45 line to link one of the SD Series CAN1 to the other CAN2.

PIN#	LCM	CAN 1	CAN 2
1	CANH	CAN_H	CAN_H
2	CANL	CAN_L	CAN_L
3	P1	Reserved	Reserved
4	VCC-	Reserved	Reserved
5	VCC+	Reserved	Reserved
6	DIS	Reserved	Reserved
7	5VS-	RND	RND
8	5VS+	Reserved	Reserved

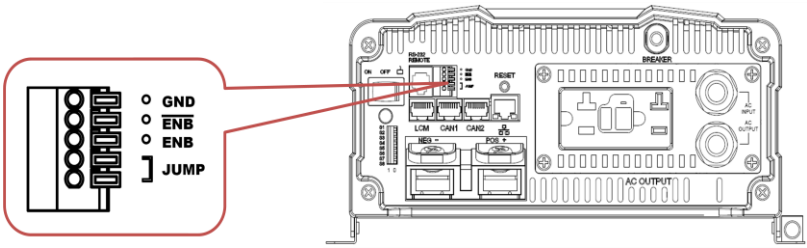
3-14. LCM Port:

Connection for LCD remote control panel, can you set and display the SD-series operation status.

LCD Remote Control Panel		SD-series
PIN Num.	Signal Description	PIN Num.
1	CANH	1
2	CANL	2
3	PON	3
4	VCC-	4
5	VCC+	5
6	DIS	6
7	5VS-	7
8	5VS+	8

The cables should be as short as possible (less than 32.8 feet / 10 meters) so that they can handle the signal.

3-15. Green terminal (Remote and Parallel select)



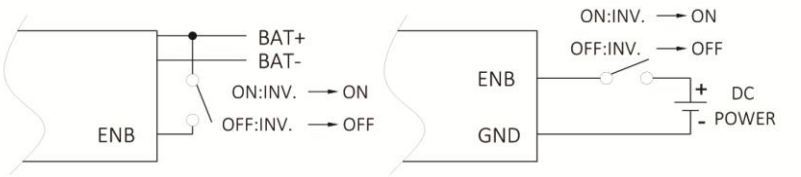
PIN#	PIN Assignment
1	GND
2	-ENB
3	ENB
4	Parallel Jump
5	Parallel Jump

3-15-1 Parallel Jump Function (please refer to section 3-6 for further detailed info.)

1. Before installing the inverter, you need to ensure the main switch is in the OFF position.
2. Use 20 ~ 24 #AWG wire to connect the parallel jump terminal.

3-15-2 Remote Control Function

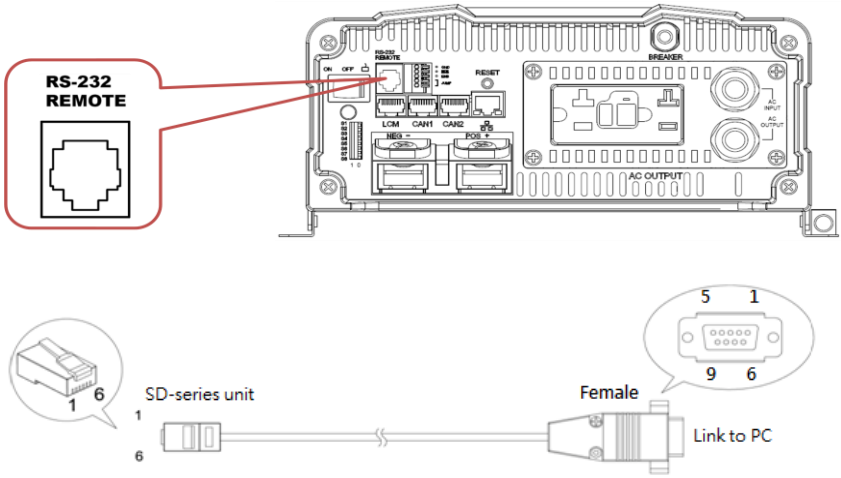
1. Before installing the inverter, please ensure that the main switch is in the OFF position.
2. Before using the remote control terminal, please ensure the main switch is in the REMOTE position.
3. Use 20 ~ 24 #AWG wire to connect the remote control terminal.
4. Remote control ON/OFF inverter setup status.



*NOTE: The above 4 methods can be used to turn ON/OFF.

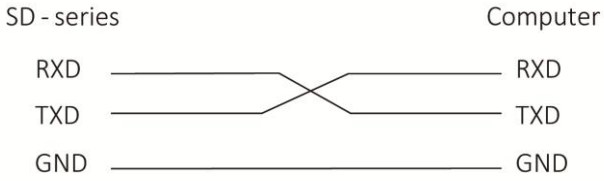
3-16. RS-232 Port

RS-232 Port: Serial port monitoring and control through computer's interface.



SD-series		Computer	
PIN Num.	Signal Description	Signal Description	PIN Num.
1	Not used	Not used	1
2	GND	GND	5
3	RXD	TXD	3
4	TXD	RXD	2
5	Not used	Not used	
6	Not used	Not used	

The connection between this SD-series and the computer is as follows:



3-17. Fan Ventilation

The rear panel must keep the distance at least 1 inch from any surrounding items.

3-18. Protections Features

Model	DC Input (VDC)					
	Over Voltage		*Over Voltage Alarm	Under Voltage		Under Voltage Alarm
	Shut-down	Restart		Shut-down	Restart	
12V	16± .25	15± .25	15.5± .25	10± .25	12.5± .25	10.5± .25
24V	32± .5	30± .5	31± .5	20± .5	25± .5	21± .5
48V	64± 1	60± 1	62± 1	40± 1	50± 1	42± 1

*OVA only LED prompt, no beeper alarm.

4. DC Wiring Connections

Follow the instructions to connect the battery cables to the DC input terminals of the Inverter. The cable should be as short as possible (less than 6 feet / 1.8 meters ideally) so that it can handle the required current in accordance with the electrical codes or application regulations. Inappropriate length of cables will reduce the

inverter performance such as poor surge capability, frequent low-input voltage warnings, and shut-down. UVP warning occurs when DC voltage drops across the cables from the batteries to inverter?

The longer or the narrower the cable is, the more the voltage drops. Increasing your DC cable diameter will help to improve the situation will help improve the situation. The following are recommended cable diameter for the best performance of the inverter. (Applies to both 120V and 230V versions)

Model No	Wire AWG	Inline Fuse
SD2500-112 / 212	# 3/0	350 A
SD2500-124 / 224	# 1	175 A
SD2500-148 / 248	# 4	90A
SD3500-112 / 212	# 4/0	500 A
SD3500-124 / 224	# 0	250 A
SD3500-148 / 248	# 2	125 A

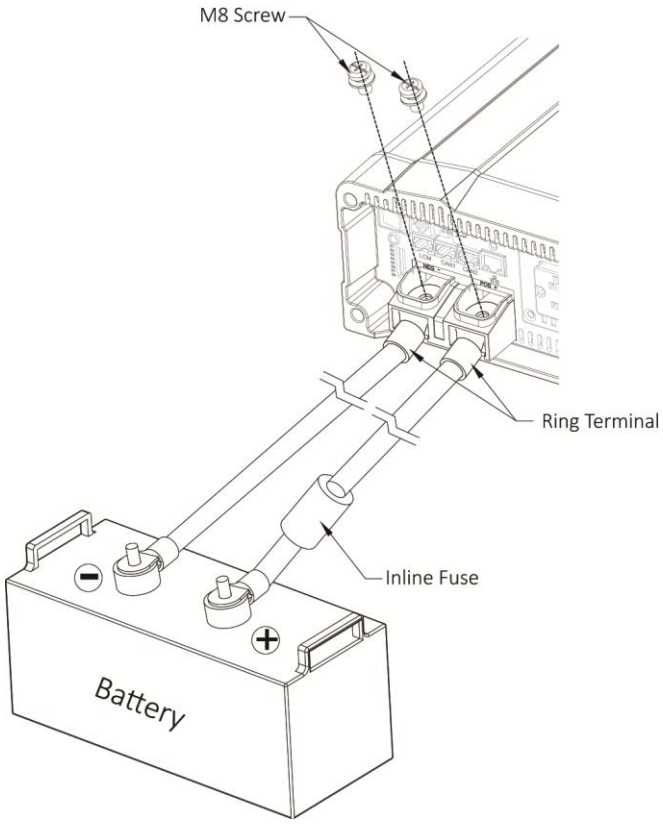
Connect the cables to the power input terminals on the front panel of the inverter. The red terminal is positive (+) and black terminal is negative (-).

Insert the cables into the terminals and tighten the screw to clamp the wires securely.

WARNING!

1. Make sure all the DC connections are tight (torque to 11 ft-lbs, 15 Nm Max.). Loose connections could overheat and result in a potential hazard.
2. The installation of a fuse must be on the positive cable. Failure to place a fuse on “+” cables running between the inverter and battery may cause damage to the inverter and will void warranty.

Also, only use high quality copper wire and keep the cable length short - maximum of 3 - 6 feet.



Do not place anything between battery cable lug and terminal surface.
Assemble exactly as shown.

Fig. 1: Battery to inverter connection

WARNING!

During the first installation, it is normal to experience a small spark is a normal phenomenon because the internal capacitors charging. Do not be concerned.

4-1. DC Input Terminals:

Connect DC input terminals to 12V / 24V / 48V battery or other power sources.

[+] represents positive, [-] represents negative. Reverse polarity connection can blow the internal fuse and may damage the inverter permanently.

Model	DC Input Voltage	
	Minimum	Maximum
12V	10V	16V
24V	20V	32V
48V	40V	64V

4-2. Hard-wire Installation:

4-2-1 SD series provides the flexibility of hard-wire connection, and this function will make external control panel wiring easier.

Step 1. > Remove the four screws of AC wiring compartment and pull it out with care.

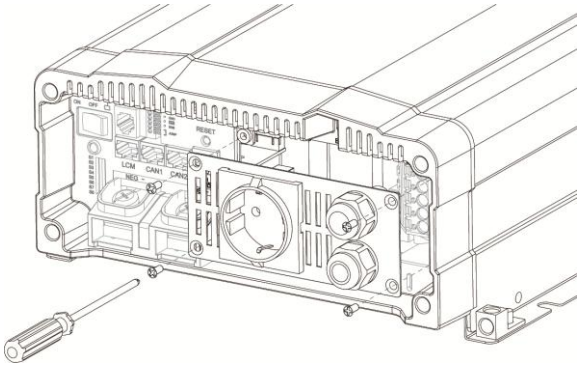
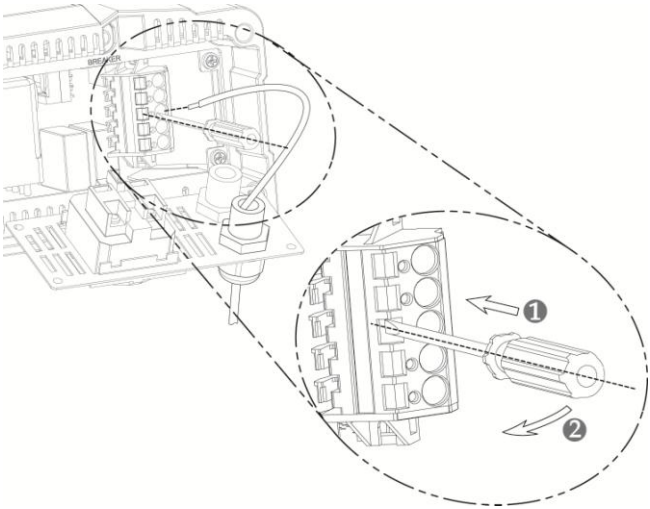
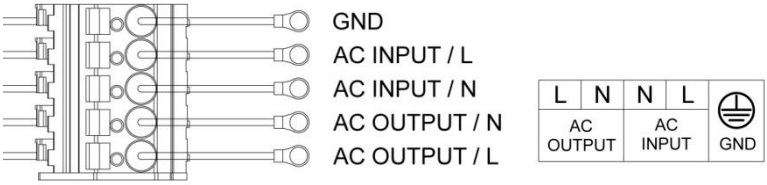


Fig 2. Pull out AC wiring compartment

Step 2. > Pull the line through the snap bushing of the AC wiring compartment cover then follow below picture operation.



100VAC~120VAC / 200VAC~240VAC System



NOTE:
The only difference between 110V and 220V is within the AC Input breaker L or N and thus will not affect the wiring configuration.

4-2-2 Connect AC output and AC input wiring to the SD series terminals. Please take the following information as your reference.

Terminal		Wire color	Wire length / gauge
AC OUTPUT	Line (L)	Black	Within 16 feet / AWG# 200-240VAC:12AWG 100-120VAC:10AWG
	Neutral (N)	White	
AC INPUT	Line (L)	Brown	
	Neutral (N)	Blue	
Ground		Green / Yellow or Bare copper	26~32 feet / AWG# 10 ~12

CAUTION!

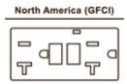
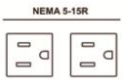
It is advised that all the electrical installation should conform to the local electrical codes and should be carried out by a certified technician.

When the unit is feeding the internally inverted voltage, the current carrying conductors connected to the “L” and “N” terminals of the AC output will be isolated from the metal chassis of the inverter. Hence, during this condition, when the metal chassis of the inverter is connected to the earth ground, the “N” terminal of the AC output will not be grounded (bonded) to the earth ground. Under this condition, the “N” terminal of the AC output will not be a Neutral in the true sense. Do not touch this terminal as it will be at an elevated voltage (almost half the value the AC output voltage) with respect to the metal chassis / earth ground and may produce an electrical shock when touched!

When the unit is transferring power from the AC input source, the grounding condition of the “N” terminal of the AC output will be the same as the condition of

the “N” terminal of the AC input source. If the AC input source is the power supplied from the utility, the “N” terminal would be a Neutral in the true sense. It will normally be bonded to the earth ground and will read almost 0 V with respect to the earth ground. In this case, touching this terminal will not be a shock hazard.

4-3-3 AC output and terminals of the SD series, you can use both the front wiring terminal and outlet, as they are connected in parallel.

Type	Number of outlet	Voltage (VAC)	Total Current (A)
GFCI 	2	125	20
NEMA 	2	125	15
Europe	1	250	16
Australia	1	250	15
U.K.	1	250	13

Note: if input current over than limit current, please adopt choose to Outlet Adaptor with 2 Sockets.

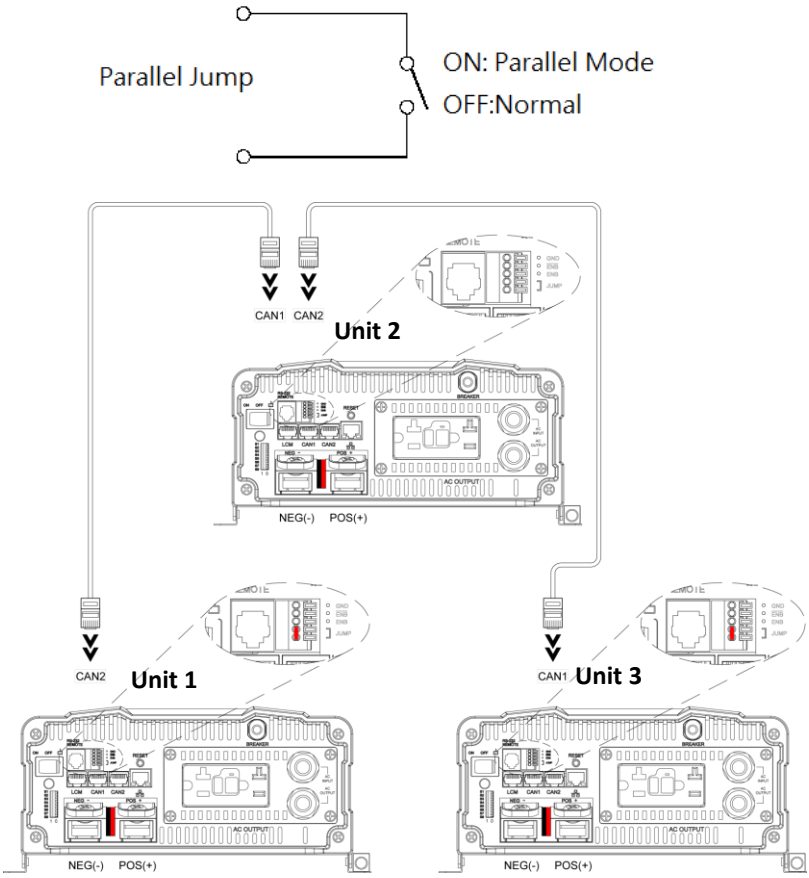
WARNING!

When using full power, it is recommended to use the wiring terminal.

5. Parallel Mode

5-1. Prepare for Parallel Usage

1. Before setting, you need to ensure that the main switch is”OFF”.
2. Before using the parallel function, you need to set the parallel jump of the green terminal the status of which must be “ON”, if the between in another SD is set to ”OFF” which is termination resistors.
3. Before using the parallel function, you need to set voltage and frequency of all units’ DIP switches to the same selection < refer to section 3-1-7 and 3-1-8>
4. Check RJ-45 line connects already < refer to section 3-1-6. >



Example: If three SD inverters are paralleled, setup green terminal.

Parallel	Unit 1	Unit 2	Unit 3
Parallel Jump	ON	OFF*	ON

* If you parallel N units, the first (unit 1) and the last unit (unit N) must set parallel jumper in ON position.

NOTE:

SD series can be used for N+1 (N≦14) redundancy and the ability of enlarge the capacity (Users can install maximum 15 units of inverters together in parallel in order to provide the power expansion).

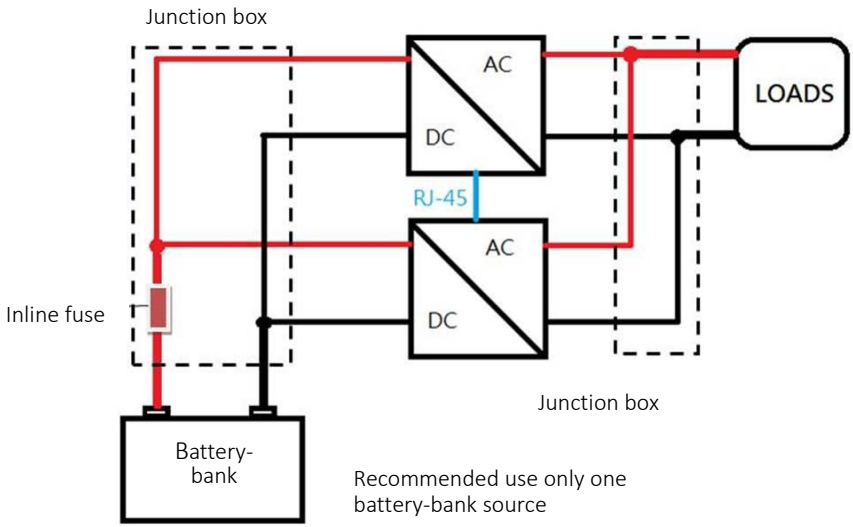
5-2. Wiring for Parallel Usage

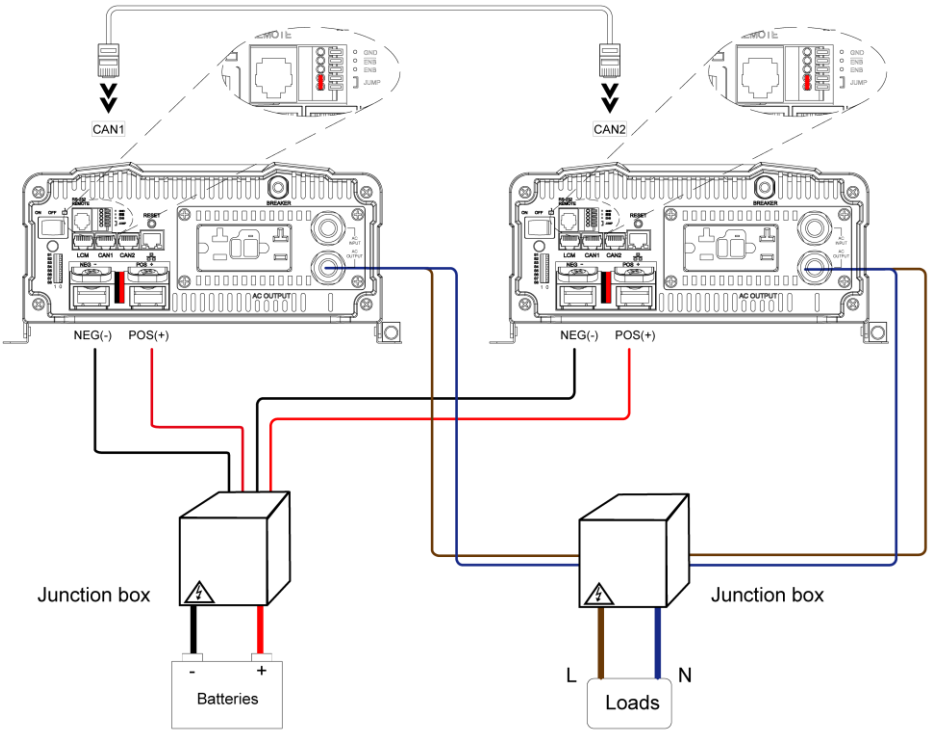
5-2-1 Connection method

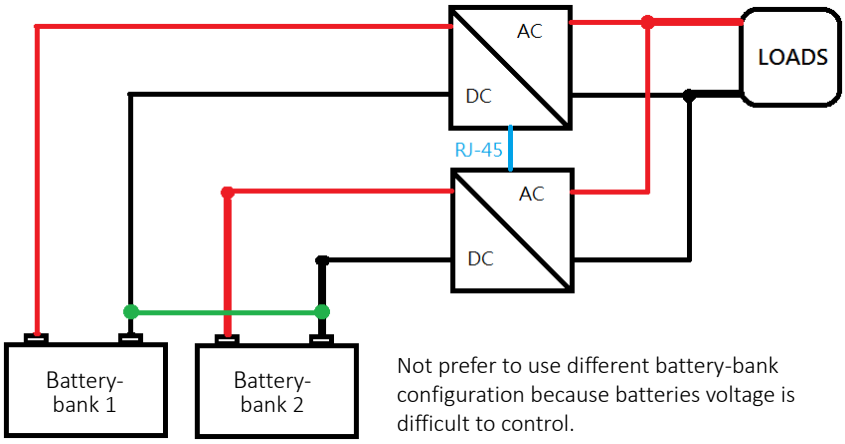
1. AC OUTPUT connector setup: Line link to Line; Neutral link to Neutral.
2. AC INPUT connector setup: Line link to Line; Neutral link to Neutral.
3. Battery connector setup: POS+ link to POS+; NEG - link to NEG –

Wring manner:

5-2-2 Connection Diagram





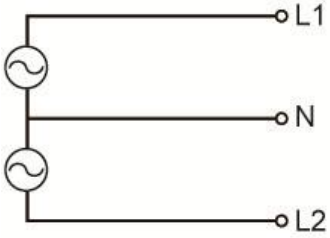
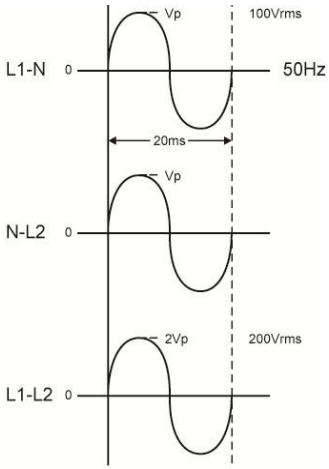
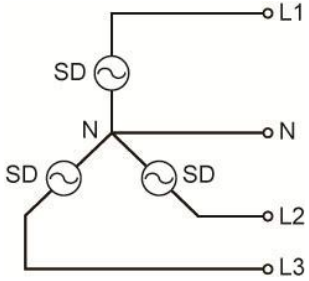


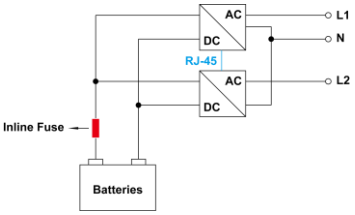
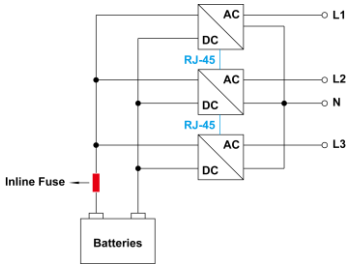
Not prefer to use different battery-bank configuration because batteries voltage is difficult to control.

5-2-3 Remove Parallel Connection

1. If “A” and “B” was used in parallel, we only need to operate one of them.
2. In the parallel mode, the first SD turned on will be the master.
3. If we just want to use only one of SDs, we can just remove RJ45 cable, but make sure the operation is performed in shut-down mode.

5-3. Industry Applications

Type	1Φ3ω	3Φ4ω
Create power system	 The SD series create 1Φ3ω power system, L1-L2 Voltage is L1-L2 double. Example: SD2500-124 set output 100V / 50Hz The L1-N:100V / 50Hz 	 The SD series creates 3Φ4ω power system. Example: SD2500-224 set output 230V / 50Hz The phase voltage is 230V / 50Hz L1-L2, L1-L3, L2-L3

Type	1Φ3ω	3Φ4ω
Set up		
Warning	1Φ3ω do not support N+1 operation, maximum of two SD inverters, THD < 4%	3Φ4ω do not support N+1 operation, maximum of three SD inverters, THD < 4% ****DIP switch (S7) must be set to "1" in this scenario****

5-3-1 1Φ3ω Switch Table

	Master	Slave 180°
S4	0	0
S5	0	1
S6	0	1
S7	1	1
S8	1	1

5-3-2 3Φ4ω Switch Table

	L1 Master	L2 -120° Slave	L3 +120° Slave
S4	0	1	1
S5	0	0	0
S6	0	0	1
S7	1	1	1
S8	1	1	1

6. RS-232 command

6-1. RS-232 command introduction

6-1-1 RS232 command:

Command format:

This unit uses high-level language commands with a CR (0DH) and LF (0AH) as the end of the command.
The system would interpret and execute the command only after these two characters are received. After the unit execute the command, it would send a response string to the computer. The response string is as follows:
= > CR LF: Command executed successfully ? > CR LF: Command error, not accepted ! > CR LF: Command correct but execution error (e.g. parameters out of range).
If the command needs any information from the unit, the unit would send the information back to the computer (with CR and LF) and then send the response string to the computer.

6-1-2 RS-232 Command format:

This unit supports the following command format.
There should always be a CR (0DH) and a LF (0AH) appended to the command while sending the command to this unit.

Command Table

Command	Function	Command	Function
POWER 1	Power on	**VINV?**	Show voltage of SD
POWER 0	Power off	**IINV?**	Show current of SD
***RST**	Recovery default setting	**VGRID?**	Show voltage of grid
FRQ?	Show frequency of SD	**VBAT?**	Show voltage of battery
PINV?	Show power of SD		

Note: A space (ASCII code 20H) is needed between Power and <value>
Example: Command to query the Functions No: Format: FUNC?
After “Enter”, the unit’s “Function Code” appears on the PC screen.

6-1-3 Command for accessing Setup Menus and adjusting values:

1. Select the Setup Menus with the help of Function Codes:
   Format: FUNC <Function Code>
   After “Enter”, the Setup Menu for the Function Code will be called.
   The <Function Code>= 0~18, <follows 5.3.5 Display tree>
2. Command to query the Functions No:
   Format: FUNC?
   After “Enter”, the unit’s “Function Code” appears on the PC screen.

3. Command to query the set value of the Function:
   Format: SETT?
   After “Enter”, the existing set value of the function appears on the PC screen.
4. Command to set or adjust the value of the Function:
   Format: SETT <value>
   After “Enter”, the new value of the Function is set Choose the <value> of the function please refer (5.3.8 Parameter Setting).

7. Troubleshooting

Problems and Symptoms	Possible Cause	Solutions
A. Power status red light is blinking fast.	Over input voltage. (OVP)	Check input voltage Reduce input voltage.
B. Power status red light is Blinking slowly.	Low input voltage. (UVP)	Recharge battery. Check connections and cables.
C. Power status red light is blinking Intermittently.	Thermal shut-down. (OTP)	Improve ventilation. Make sure ventilation, shafts of the inverter are not obstructed. Lower ambient temperature.
D. Power status is solid red	Short circuit. Wiring error. Over Loading (OLP)	Check AC wiring for short circuit. Reduce load.

8. Warranty

We guarantee this product against defects in materials and workmanship for a period of 24 months from the date of purchase. Please contact with your local COTEK authorized distributor for RMA (Return material Authorization) service. Please note that COTEK will ensure our products are operational before delivery and the warranty service is offered to the unit which has defect caused under normal use, in the judgment of COTEK’s technician. The warranty is null and void under the following circumstances:

(a) If the unit has been damaged through abuse, misuse, negligence (such as bumping, wetting), fault voltage supply, air/water pollution accidents and natural calamities.

(b) If the serial number has been altered, effaced or removed.

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